A New Hawaiian Subspecies of *Cypraea cernica* SOWERBY

by

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(Plate 1)

In the late summer months of 1959, the Pele Expedition, dredging in the coastal waters of Hawaii, brought up several specimens of Cypraea cernica cernica Sowerby, 1870. This species is not recognized as having been known from this locality before, yet there can be no question of its valid existence here as a well-established natural population, since twelve specimens were collected from two relatively widely separated deep-water stations.

One cannot dispute the close affinity that exists between the earlier described subspecies of Cypraea cernica; however, with these newly dredged specimens at hand, it was noted that obvious morphological variations were apparent when compared with those shells of the already described populations, thus suggesting a hitherto unknown race deserving taxonomic recognition.

In the study of the Cypraeidae, one questions the systematics as applied to three of the polytypic subspecies of Cypraea cernica cernica. This problem has become even more apparent with the discovery of a new and remote deep-water population in the Hawaiian Islands. Although the differences between the subspecies of C. cernica are of a constant character, their distinguishing features seem not great enough to separate them on the species level from the typical species C. cernica, sensu stricto, found in Mauritius.

It would seem that Cypraea tomlini tomlini Schilder, 1930, had originally been adequately identified as C. cernica tomlini Schilder. Iredale (1935), on the basis of size differences alone, raised the subspecies C. cernica tomlini to the species level. This resulted in the subsequently described subspecies, prodiga Iredale, 1939, and ogasawarensis Schilder, 1945, being associated with the new species C. tomlini instead of with the original C. cernica. Specimens of four of the subspecies have been very carefully examined and they do not, in our opinion, show enough differences to place them in any more than subspecific categories with the typical species C. cernica cernica. Until there are enough specimens available for a study of a series, including live-collected mollusks for comparative anatomical work, it seems inadvisable to establish a new specific form. In the interest of conserving scientific names and avoiding nomenclatural confusion, the new subspecies described below is hereby associated with its typical species C. cernica cernica.

The status of this species and its associated subspecies is therefore revised as follows:

Cypraea cernica cernica Sowerby, 1870
Cypraea cernica tomlini Schilder, 1930
Cypraea cernica percomis Iredale, 1931
Cypraea cernica ogasawarensis Schilder, 1945
Cypraea cernica marielae Cate, n. subsp.

All specimens taken on the Pele Expedition were dead. Of the twelve, two were clean and fresh, obviously having recently expired; the remainder were more or less encrusted with varying amounts of lime, although all were fairly well preserved as to color and condition. None were pellucid. Of earlier record are four specimens which conform with the morphological characteristics of the new subspecies: one collected at Pearl and Hermes Reef (Ditlev Thaanum Collection), two from Midway Island (Bishop Museum Collection and C. M. Burgess Collection), and one beach specimen collected at Pomaluu on the north shore of Oahu (C. M. Burgess Collection).

Two specimens, the holotype and paratype No. 1, were dredged at 55 fathoms in the deep-water trough that exists in the ocean triangle formed by the islands of Maui, Lanai, and Molokai (20°57' N. Lat., 156°47' W. Long.). Ten additional specimens were brought up on different dates and in different dredge hauls, in from 65 to 100 fathoms, roughly a mile south of Keehi La-

Table 1: Comparative Index for

SPECIES	COLUMELLAR TEETH	LABIAL TEETH	AVERAGE SIZE
Cypraea cernica cernica (Mauritius)	Bold, strong, long, extending well over on base	Long, extending almost to margin	23.8 mm.
Cypraea cernica ogasawarensis (Bonin Islands)	Fine, shorter, less defined	Lengthened uniformly to lip	28.7 mm.
Cypraea cernica tomlini (New Caledonia, Loyalty Islands, Phoenix Group)	Bold, large, clear-cut	Well developed, strong, emerging well onto lip	29.2 mm.
Cypraea cernica marielae (Maui, Hawaiian Islands)	Well defined, short, moderately occupying base .	Bold, thickening interstices broadening anteriorly	36.1 mm.
Cypraea cernica prodiga (New South Wales)	Strong, 14 teeth on columella, 6th or 7th the shortest	Strong, flattened ridges extending across 3/4 of lip	30.1 mm.
Cypraea cernica percomis *)			

*) Iredale, 1931: unverified and questionable species based on a single specimen from Sydney Harbor dredging.

goon, Oahu (21°17' N. Lat., 157°54' W. Long.). The Maui specimens were dredged from a mud and coral-rubble substrate, the Oahu specimens from sand and coral-rubble.

The type locality of the new subspecies is off Maui, Hawaiian Islands (20°57' N. Lat., 156°47' W. Long.).

Because of the great ocean depths surrounding the Hawaiian Archipelago, it is felt that this natural population is sufficiently removed and isolated from its other related races to establish it as a form maintaining constant morphological characteristics which clearly separate it from its known conspecific units.

Cypraea cernica marielae Cate, new subspecies

Shell large, solid, pyriformly ovate; narrowing anteriorly, base and sides rounded, right side margined, thickened, and distinctly pitted; aperture somewhat broad, curving acutely to the left posteriorly; posterior terminal produced, anterior collar more so. Teeth coarse, well defined, short on the columella, lengthening posteriorly; labial teeth bold, extending almost to margin. Columellar teeth angling slightly onto fossula, the fine anterior teeth crossing it, the last three becoming prominent on the in-

Cypraea cernica cernica and its Subspecies

SHELL COLOR	SHELL MORPHOLOGY
Pale yellow to whitish yellow; white spots fine, often indistinct. Chestnut marginal spots almost lacking. Base and teeth white.	Small, stunted, circular-ovate; terminal less produced, margins thickened, weakly pitted; base convex.
Ochraceous yellow, hint of darker lateral dorsal band. White spots evenly dispersed. Chestnut marginal spots less numerous. Base and teeth white.	Narrower, sub-ovate; less humped; terminals extended, margins well calloused, strongly pitted; base convex.
Ochraceous yellow, white spots more abundant, diffused, confluent. Chestnut marginal spots profuse, extending onto base; base and teeth white.	Ovate, humped, lengthening anteriorly; terminals somewhat produced, margins strongly pitted, less thickened; base prominently convex.
Yellow-ochre, white spots fine, less distinct, occasionally individually large dispersing abundantly. Chestnut marginal spots large, few or entirely lacking; base and teeth white.	Pyriformly ovate, large, heavy; terminals well produced, margin less calloused, strongly pitted; base bulbously convex.
Dull orange, texture clear, shiny; irregular white spots distributed evenly; base and teeth white.	Shell appears to be larger than the typical Cypraea cernica tomlini.

ner edge of the fossula. Dorsum smooth, yellow-beige, generously covered with irregularly sized white spots; mantle line of deeper color extending length of upper right dorsum; base and teeth white; large chestnut spots on left margin extend restrictedly onto base; marginal pits chestnut.

Cypraea cernica marielae is by far a much larger and heavier shell, more pyriform than ovate, having coarser teeth, and with fewer chestnut marginal spots than C. cernica tomlini, but more than found on the specimens of C. cernica ogasawarensis. Its extremities are more produced and sharpened, its anterior terminal ridge is less oblique and much more prominent, and the aperture broader and more recurved than either of the other subspecies. (See Table 1)

[Topotypes of "Cypraea tomlini tomlini" (leg. A. W. Emerson, Baker Island, Nov. 6, 1923; BPBM No. 69198) and "C. tomlini ogasawarensis" (leg. Jay Savory, Hana, Bonin Islands) in the collection of the Bernice P. Bishop Museum, Honolulu, were kindly made available for this comparative study by Mr. Edwin H. Bryan, Jr., and Dr. Yoshio Kondo.]

The name given this new subspecies is used to honor Mrs. Mariel King of Honolulu,

Table 2: Measurements of Types of *Cypraea cernica marielae* CATE, subspec. nov.

Measurements in millimeters

	Length	Width	Height	Location
Maui Specimens:				
Holotype	37.0	23.3	18.5	B. P. Bishop Museum
Paratype 1	35.5	24.8	19.0	C. N. Cate Collection
Keehi Lagoon Specimens:				
Paratype 2	27.4	18.9	19.0	C. S. Weaver Collection
Paratype 3	20.1	14.4	10.2	C. S. Weaver Collection
Paratype 4	14.4	8.8	7.3	C. S. Weaver Collection
Paratype 5	23.0	15.5	12.0	Mariel King Collection
Hypotype 1	21.2	15.3	11.4	Dr. T. Richert Collection
Hypotype 2	19.0	13.3	10.0	Dr. T. Richert Collection
Hypotype 3	19.6	13.3	10.0	R. P. Gage, Jr. Collection
Hypotype 4	17.6	12.0	9.0	R. P. Gage, Jr. Collection
Hypotype 5	30.8	22.2	16.8	Dr. C. M. Burgess Collection
Hypotype 6	19.2	14.0	10.0	Dr. C. M. Burgess Collection
Additional Record:				
[Beach specimen collected at Pomaluu, Oahu]				
Hypotype 7	30.3	21.3	17.0	Dr. C. M. Burgess Collection

whose devotion to conchology made possible the Pele Expedition, a segment of which involved the dredging of the Maui-Lanai-Molokai triangle where the first shells of this subspecies were taken.

The holotype will be deposited in the Bernice P. Bishop Museum, Honolulu, Hawaii, where it will bear the catalog number 212711.

An interesting feature of shell size variation is apparent in Cypraea cernica cernica that should be kept in mind where shell identification is involved. A detailed treatment of geographical variation is not feasible here, but it is interesting to note that in the study of C. cernica cernica, available adult shells range from 21.2 mm. to 27.5 mm., while those of C. cernica marielae vary from 20 mm. to 37 mm. A juvenile specimen of the new subspecies, well approaching adulthood, measures 14.4 mm. (See Table 2)

The distance between the two Hawaiian habitats (Maui and Oahu) is probably insufficient to separate these two populations. They are probably nothing more than intrapopulation variants. It is felt that the morphological variation shown is strictly noninherited. The type specimens considered here seem to represent the end of a cline whose character gradient sets them apart as the representatives of this new geographical subspecies.

Not having large series of these shells for study precludes ascertaining definite size categories for the different subspecies. Generalization must therefore be considered in the light of their size relationships with one another until more information about their development becomes available. Whether the Maui and Oahu populations should be separated subspecifically will have to be determined eventually on the basis of collections made in the intermediate area.

Additional dispersal data and experimental evidence will be necessary to place these sympatric populations of Cypraea cernica marielae into anything greater than inter-

Figure 1 Figure 2 Figure 1a Figure 2a

Figure 3 Figure 4 Figure 5

Figure 3a Figure 4a Figure 5a

Figure 1, 1a: *Cypraea cernica marielae* CATE, subspec. nov., Holotype
Figure 2, 2a: *Cypraea cernica marielae* CATE, subspec. nov., Paratype 1
Figure 3, 3a: *Cypraea cernica cernica* SOWERBY
Figure 4, 4a: *Cypraea cernica tomlini* SCHILDER
Figure 5, 5a: *Cypraea cernica ogasawarensis* SCHILDER